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10/734,535

12/11/2003

Ron Porat

9234

9706

24244

7590

06/27/2007

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EXAMINER

ELPENORD, CANDAL

ART UNIT

PAPER NUMBER

2609

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/734,535

Applicant(s)

PORAT ET AL.

Examiner

Candal Elpenord

Art Unit

2609

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9 is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) —
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 7-8 and 10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For **claim 7**, the phrase "the method wherein the assignment of each data bit to carriers is according to Table 1" is vague and indefinite since it is not known what the metes and bounds of the claimed invention. Similar problems exist in **claim 8** line 1-2 and **claim 10** line 1-2.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. **Claims 1-3** are rejected under 35 U.S.C. 102(e) as being anticipated by **Walton et al. (US 7,095,709 B2)**.

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**For claim 1, Walton et al.** discloses a method of creating a frequency diversity in a multicarrier OFDM signal by assigning redundant copies of each data bit to a plurality of carriers to create a non-periodic bit assignment wherein frequency intervals between carrier is different for each interval (**see column 2 line 60-63**)

**For claim 2, Walton et al.** discloses a method of allocating data bits to carrier for transmission in a multicarrier modulation symbol, which comprises a plurality of carriers each capable of being modulated with at least one data bit, to create frequency diversity (**see column 2 line 45-52**), the method comprising the steps of:

(a) selecting a data bit (**see column 10 line 1-3**)

(b) assigning the data bit to a plurality of carriers comprising the steps of:

assigning the data bit to a second carrier with a first carrier spacing from the first carrier (**see column 11 line 32-38**);

(c) assigning the data bit to a third carrier with a second carriers spacing from the second carrier that is different from the first carrier spacing (**see column 11 line 1-3**);  
and

(d) repeating the steps of selecting data bits and assigning data bits to carriers until all data bits are assigned to carriers and all carriers have a data bit assigned (**see column 10 line 55-60**).

**For claim 3, Walton et al.** discloses a method wherein each carrier spacing for each data bit is different from every other carrier spacing for the data bit (**see column 11 line 7-11**).

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5. **Claims 6** is rejected under 35 U.S.C. 102(e) as being anticipated by **Walton et al. (US 2002/0154705 A1)**

**For claim 6, Walton et al.** discloses a method of transmitting a message comprising bits of data using a plurality of a multicarrier modulation symbols to create frequency diversity (**see paragraph 0013 line 2-4**), each symbol comprising a plurality of carriers capable of being modulated with at least one data bit (**see paragraph 0013 line 6-13**), the method comprising the steps of:

- (a) determining the number of data bits (**see paragraph 0101 line 1-3**) transmitted in each symbol (**see paragraph 0125 line 20-25**)
- (b) selecting from the message a number of data bits equal to the number of bits transmitted in each symbol (**see paragraph 0021 line 1-2**); and
- (c) assigning each data bit to a plurality of carriers wherein the separation of the carriers used to transmit each data bit is non-periodic (**see paragraph 0016 line 1-7**).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- 1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) p

9. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Walton et al. (US 7,095,709 B2)** in view of **Hosur et al.**

**As for claim 4, Walton et al. and Hosur et al. fail to disclose the method wherein the ratio of carriers to data bits is 16. However, the method wherein the ratio of carriers to data bits is 16 is well known in the art. Thus it would have been to one skilled in the art at the time the invention was made to vary the ratio of carriers to data bits though design. The OFDM frequency diversity methods of Walton et al. and Hosur et al. can modified/implemented generated the method of the claimed invention in which the ratio of ratio of carriers to data bits is 16 by design engineering and simulation. The motivation being that it provides a better frequency diversity.**

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10. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Walton et al. (US 2002/0154705 A1)**, in view of **Hosur et al. (US 2001/0033623 A1)**.

For claim 5, **Walton et al.** teaches a method of creating frequency diversity in a multicarrier symbol by assigning redundant copies of each data bit (see column 2 line 45-52). However, **Walton et al.** fails to teach the method of creating frequency diversity in a multicarrier signal by assigning redundant copies of each data bit of a 32-bit value among 256 transmitted carriers, each carrier corresponding to a bin number, the assignment performed according to Table 1. However, **Hosur et al.** in a similar field of endeavor discloses a method of creating frequency diversity in a multicarrier signal by assigning redundant copies of each data bit of a 32-bit value among 256 transmitted carriers (see paragraph 0052 line 1), each carrier corresponding to a bin number, the assignment performed according to Table 1. Therefore, it would have been obvious to one of ordinary skill in the art at the time that invention was made to incorporate the network method of transmission diversity as taught by **Hosur et al.** into the OFDM diversity method of **Walton et al.** to prevent multipath fading or signal degradation. The wireless diversity method of **Hosur et al.** can be modified/implemented into the OFDM diversity method of **Walton et al.** to produce the table as claimed by software programming. The motivation for doing that is to increase network performance by frequency diversity.

***Allowable Subject Matter***

11. **Claim 9** is allowable.

12. The following is an examiner's statement of reasons for allowance:

**For claim 9**, prior art fails to teach an OFDM modulator for transmitting a binary data word in a symbol having frequency diversity comprising:

a ramp counter for producing a series of bin number values; a look up table for mapping the bin number values to bit select values, the look up table comprising entries that produces assignment of bits to non-periodic carriers within the symbol; a data selector for selecting at least one bit from the binary data word according to each bit select value; and an amplitude mapper for producing complex I and Q amplitudes for the selected bits.

### ***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Miyashita et al. (US 6,304,611 B1), Ikeda et al. (US 7,158,475 B1) and Kim et al. (US 2002/01721184 A1). are all cited to methods for creating frequency diversity in an OFDM multicarrier symbol through bit allocation.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Candal Elpenord whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 7:30AM to 5:00PM EST.

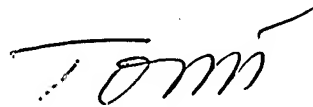
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dang Ton can be reached on (571) 272-3171. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CE



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SUPERVISORY PATENT EXAMINER